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## COLLIDER-ACCELERATOR DEPARTMENT

Title: Installation and Use of Tunnel Pressurization System  
with Rolled Flange Quick Disconnect Pressure Assemblies

Author: G. McIntyre  
Group: Collider Mechanical Support Procedure

### Approvals

Group Leader: \_\_\_\_\_ Date: \_\_\_\_\_

ESHQ Division Head: \_\_\_\_\_ Date: \_\_\_\_\_

indicate additional signatures)

☐ ☐ FS Representative: \_\_\_\_\_ Date: \_\_\_\_\_

☐ ☐ Radiological Control Coordinator: \_\_\_\_\_ Date: \_\_\_\_\_

☐ ☐ Chief ME: \_\_\_\_\_ Date: \_\_\_\_\_

☐ ☐ Chief EE: \_\_\_\_\_ Date: \_\_\_\_\_

☐ ☐ Environmental/P2 Coordinator: \_\_\_\_\_ Date: \_\_\_\_\_

☐ ☐ QA Manager: \_\_\_\_\_ Date: \_\_\_\_\_

☐ ☐ Other: \_\_\_\_\_ Date: \_\_\_\_\_

# INSTALLATION AND USE OF ROLLED FLANGE QUICK DISCONNECT PRESSURE ASSEMBLIES FOR IN-TUNNEL PRESSURIZATION

## 1.0 Purpose and Scope

This procedure covers the installation and use of rolled flange quick disconnect pressure caps (RF-QD) in terminating dipole and CQS magnet end volume helium lines for in-tunnel pressurization, with high pressure helium or nitrogen gas. This procedure will be executed for the leak checking of the interconnect end volume helium line and Warm-to-Cold transition welded connections.

## 2.0 Responsibilities

Persons installing and pressurizing the RHIC In-Tunnel Pressurization System and RF-QDs are responsible for following this procedure.

## 3.0 Prerequisites

3.1 All personnel involved in implementing this procedure, shall have been trained on this procedure and the equipment, by the cognizant engineer, or the cognizant technical supervisor.

### 3.2 Required Tools

- A Rolled flange End Cap Assembly, pressure tested to 140psig (4, 1 with an NPT pressure fitting) with flat, donut-shaped Viton seals (1 each), clamp retaining ring (1 each) and ISO Single Claw Clamps (6 each).
- B Tape, Caution (BNL# K-72110).
- C Scotchbrite<sup>®</sup>, gray or black, or equivalent.
- D Alcohol, Ethyl, in safety approved container.
- E Safety approved pressurization system, relief valve set to 105 psig.

## 4.0 Precautions

- 4.1 When pressure testing all non-test personnel must stay behind the caution tape and out of immediate test area.
- 4.2 When system is under pressure, do not, under any circumstances attempt to adjust, move, or change the restraints in anyway, shape, or form.
- 4.3 Exceeding a pressure of 100 psig will open the relief valve. Do not exceed the specified test pressure
- 4.4 Use extreme caution when working with any type of high-pressure test equipment.
- 4.5 Failure to follow these operating procedures explicitly could result in catastrophic injury and possibly death.

## 5.0 **Procedure**

### 5.1 **Configuration of Rolled Flange QD Assemblies for Testing Operations:**

All QD assemblies must be welded by a BNL qualified welder to Welding Procedure Specification (WPS) No. SS1-92A, manually or automatically.

### 5.2 **Installation Procedure**

- 5.2.1 Inspect the round portion of the rolled flange for nicks or scratches. Bring any large or deep scratches to your supervisor's attention. Wipe the flange clean with alcohol to remove any debris.

#### **CAUTION**

**Care must be taken not to cut or nick the QD assembly's Viton seal. If the o-ring is damaged gas may leak from the QD. Replace any damaged seals prior to assembly installation.**

- 5.2.2 Place a donut-shaped Viton seal on a magnet's rolled flange.  
5.2.3 Slip the retaining ring over the capped end of the RF-QD.

#### **CAUTION**

**Care must be taken not to over bend the superconducting bus while feeding it into the RF-QD assembly. Let the bus slide along the ID of the assembly. Over-extension of the bus can lead to bus failure and expensive repairs.**

- 5.2.4 Thread the RF-QD assembly over magnet superconducting bus and voltage tap wires, capturing the seal between the assembly's rolled flange and the R-F of the magnet. Be certain to mount the RF-QD, containing the ¼"NPT pressure fitting, on the end of the magnet string from which the string will be pressurized.  
5.2.5 Start the 6 claw clamps into the retaining ring.  
5.2.6 Capture the mating rolled flanges and the properly mounted seal with the 6 claw clamps.  
5.2.7 Tighten the claw clamps until the seal begins to extrude from between the flanges (approximately 10 ft-lbs).  
5.2.8 Repeat steps 5.2.1 through 5.2.7 for the remaining uncapped rolled flanges.

### 5.3 **Pressure Testing**

- 5.3.1 Pressure decay during pressurization indicates a gas leak in the system (i.e., magnet string and/ or pressurization system). If a pressure decay occurs close the valve between the pressurization system and the magnets then contact your supervisor. The QD installation procedure should be reviewed prior to reattempting to pressurize. With the pressure vented from the system, verify the assembly of each QD joint before continuing.

**WARNING**

**ALL NON-TEST PERSONNEL SHALL REMAIN A MINIMUM OF 50 FEET FROM THE IMMEDIATE TEST AREA WHEN PRESSURE TESTING. ONLY AUTHORIZED TEST PERSONNEL ARE PERMITTED IN THE IMMEDIATE TEST AREA WHEN PRESSURE IS APPLIED.**

- 5.3.2 Ensure all QD joints are complete and both restraints are in place.
- 5.3.3 String Caution Tape across the tunnel a minimum of 50 feet from either end of the magnet string being pressurized. The test operator shall ensure only personnel required for the test enter this restricted area while the test article is pressurized.
- 5.3.4 Connect the pressure source to the quick disconnect fitting on the spoolpiece or the RF-QD assembly, whichever is applicable, using a regulator with gauge, bleed valve, and relief valve. The relief valve shall prevent the line pressure from exceeding 100 psig.

**WARNING**

**WHEN PRESSURE TESTING ALL NON-TEST PERSONNEL SHALL REMAIN A MINIMUM OF 50 FEET FROM THE IMMEDIATE TEST AREA. ONLY AUTHORIZED TEST PERSONNEL ARE PERMITTED IN THE IMMEDIATE TEST AREA WHILE THE TEST SYSTEM IS PRESSURIZED.**

**WARNING**

**NEVER ATTEMPT TO ADJUST A RESTRAINT WHILE UNDER PRESSURE.**

- 5.3.5 Slowly increase gauge pressure to 100 psig or less. Observe the pressure gauge to ensure there is no pressure decay. Pause two to three minutes to equalize piping strains.
- 5.3.6 Leak check in accordance with the appropriate in-tunnel procedure.

**WARNING**

**FAILURE TO RELEASE ALL PRESSURE FROM THE TUBE MAY RESULT IN DAMAGE OR PERSONAL INJURY WHEN THE FLANGE HARDWARE IS LOOSEMED.**

**5.4 Removal**

- 5.4.1 Release all test pressure from the magnet string via the vent valve in the pressurization system. Use the tunnel exhaust port to vent all helium from the tunnel.

**WARNING**  
**NEVER ATTEMPT TO ADJUST A RESTRAINT WHILE UNDER PRESSURE.**

- 5.4.2 Unbolt the claw clamps and remove them from the end volume's rolled flanges. Store in designated area.
- 5.4.3 Inspect the RF-QD assemblies for damage or wear and replace any damaged components (i.e., Viton seal being cut or nicked or caps being dented). **Any component which is damaged must be replaced or retested before attempting any further pressurizing with it.** Contact your supervisor regarding replacement parts.

**6.0    Documentation**

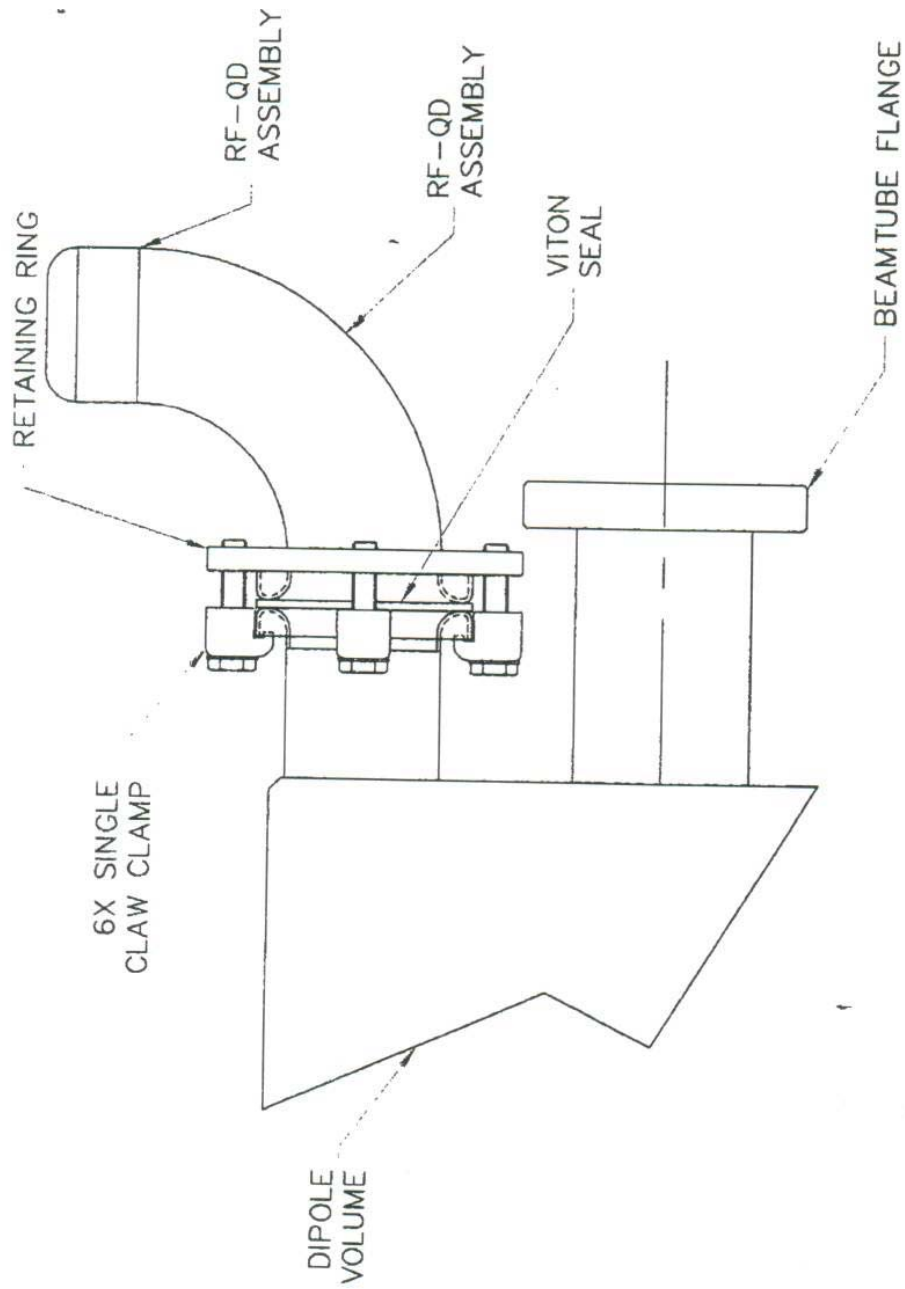
Applicable Interconnect Traveler (e.g., 1ADQ, 1HRD, WTC1, IREP1, NREP1, etc.)

**7.0    References**

None

**8.0    Attachments**

- 1       Rolled Flange style Pressure Restraint Assembly



# ROLLED FLANGE QUICK DISCONNECT ASSEMBLY

ATTACHMENT 1